

**From:** Piro, Peter (DPH)  
**Sent:** Friday, January 09, 2009 9:15 AM  
**To:** Khan, Annie (DPH)  
**Subject:** FW: Tolerance

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**From:** Dan.Yaconis@mt.com [mailto:Dan.Yaconis@mt.com]  
**Sent:** Tuesday, February 12, 2008 10:20 AM  
**To:** Piro, Peter (DPH)  
**Subject:** RE: Tolerance

Peter,  
You can use 2 sigma over the entire range. The 1 sigma for weights over 10% is the suggestion of our R&D Group.  
Dan Y

-----Original Message-----

**From:** Piro, Peter (DPH) [mailto:Peter.Piro@state.ma.us]  
**Sent:** Tuesday, February 12, 2008 10:11 AM  
**To:** Yaconis Dan MT-NA  
**Subject:** RE: Tolerance

Why does mettler use 1 standard deviation over 10 % capacity and 2 standard deviations under 10%? And would it be ok to use 2 sigma for the entire weight range?

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**From:** Dan.Yaconis@mt.com [mailto:Dan.Yaconis@mt.com]  
**Sent:** Monday, February 11, 2008 1:40 PM  
**To:** Piro, Peter (DPH)  
**Subject:** RE: Tolerance

Peter,  
Everything is correct except for the repeatability value used for over 10%. We use the published repeatability without being doubled.  
Thank you for using our products!  
Dan Y

-----Original Message-----

**From:** Piro, Peter (DPH) [mailto:Peter.Piro@state.ma.us]  
**Sent:** Monday, February 11, 2008 1:03 PM  
**To:** Yaconis Dan MT-NA  
**Subject:** RE: Tolerance

Hi Dan,

For the AB104, the manual says 0.1mg repeatability and 0.2mg linearity. So at 10% capacity or less, tolerance is  $2\sigma$  (repeatability) =  $2(0.1\text{mg}) = 0.2\text{mg}$  and over 10% capacity tolerance is  $0.2$  (from the repeatability influence)  $+ 0.2$  (linearity influence) =  $0.4\text{mg}$ , with the high end tolerance being the summation of the two? Thanks in advance for your patience!

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**From:** Dan.Yaconis@mt.com [mailto:Dan.Yaconis@mt.com]  
**Sent:** Monday, February 11, 2008 12:35 PM  
**To:** Piro, Peter (DPH)  
**Subject:** RE: Tolerance

Peter,  
The estimates are based on published repeatability and linearity specifications for that specific model. For very light samples (10% of balance capacity or less) we only consider repeatability as an error causing factor. Repeatability is a standard deviation which is 1 sigma or 65% and most customers want to use 2 sigma or 95% success rate. We include linearity error for samples over 10% to capacity. I hope that this helps!  
Dan Y

-----Original Message-----

**From:** Piro, Peter (DPH) [mailto:Peter.Piro@state.ma.us]  
**Sent:** Monday, February 11, 2008 12:06 PM  
**To:** Yaconis Dan MT-NA  
**Subject:** RE: Tolerance

So is your definition of tolerance derived from a precision study with tolerance being 2 times the standard deviation?

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**From:** Dan.Yaconis@mt.com [mailto:Dan.Yaconis@mt.com]  
**Sent:** Thursday, February 07, 2008 5:53 PM  
**To:** Piro, Peter (DPH)  
**Subject:** RE: Tolerance

Peter,  
Here are the estimated 2 sigma tolerances for your balances. If you have any questions I can be reached at 800-838-8537, when the phone answers dial 1, then 4821. This will ring directly to my desk. You can also contact me via email at [Dan.Yaconis@mt.com](mailto:Dan.Yaconis@mt.com) or send me a fax at 614-430-2508.

Thank you for using Mettler Toledo products!  
Dan Yaconis - Mettler Toledo Technical Support

-----Original Message-----

**From:** Piro, Peter (DPH) [mailto:Peter.Piro@state.ma.us]  
**Sent:** Tuesday, February 05, 2008 10:34 AM  
**To:** Yaconis Dan MT-NA  
**Subject:** Tolerance

Hi Dan,

I spoke to you this morning about the tolerance for different Mettler balances. If you could send me any information for the balances below, I would greatly appreciate it.  
Also, if you have any information explaining repeatability and linearity and how that relates to tolerance that would be greatly appreciated!

Thank you  
Peter Piro

METTLER AB104, samples up to 11g +/- 0.2mg, samples over 11g up to 110g capacity +/-0.3mg  
METTLER AG104, samples up to 10 g +/- 0.2mg, samples over 10g up to 101g capacity +/-0.3mg  
METTLER AB104S, samples up to 11g +/- 0.2mg, samples over 11g up to 110g capacity +/-0.3mg  
METTLER AB204, samples up to 21g +/- 0.2mg, samples over 21g up to 210g capacity +/-0.4mg  
METTLER AJ100, samples up to 11g +/- 0.2mg, samples over 11g up to 110g capacity +/-0.4mg  
METTLER B3002, samples up to 310g +/- 0.02g, samples over 310g up to 3,100g capacity +/-0.04g  
METTLER B3002DR, samples up to 60g +/- 0.02g, samples over 60g up to 600g +/-0.03g, samples over 600g to 3,100g capacity +/-0.2g  
METTLER SB32000, samples up to 3,200 +/- 1g, samples over 3,200g up to 32,100g capacity +/- 2g  
METTLER PC2000, samples up to 210g +/- 0.02g, samples over 210g up to 2100g capacity +/- 0.03g  
METTLER PC16, samples up to 1,650g +/- 0.2g, samples over 1,650g up to 16,500g capacity +/- 0.3g

